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ABSTRACT

In Malaysia, vocational education and training (VET) is accorded a high priority in the nation's industrialization agenda. With the vision of becoming an industrialized nation in 2020, Malaysia must prepare a well-educated, skilled, and competitive workforce. The government has placed human resource development as a major emphasis and strategic policy to enhance Malaysia's competitive edge over other developing countries. In this era of globalization and the knowledge economy (k-economy), the future of Malaysia's competitiveness depends on the skills of its workforce. It is critical to assess the impact of globalization on technical-vocational education and training systems. Several major initiatives, such as the development of the Multimedia Super Corridor, have interconnected Malaysia with other developed nations in the world. Efforts are currently being made to fully use information technology in transforming the Malaysian society into a knowledge-based society. The advancement of the Internet and the multimedia technologies has been increasingly visible in the government and corporate sectors. The impact of globalization and k-economy has led to a heightened awareness of the need to reform the technical-vocational education and training systems. (Contains 18 references.) (YLB)

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Globalization and its Impact on Technical-Vocational Education and Training in Malaysia

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Abstract

The emerging and growing interdependence among nations has created a wave of excitement about globalization. As the wave of globalization reached almost every corner of the globe, each nation should be prepared to meet its challenges. One of the challenges is the critical preparation for the future workforce. In preparing a competitive workforce for "a global marketplace," vocational education and training (VET) has played an important role. In Malaysia, vocational education and training is accorded a high priority in the nation's industrialization agenda. With the vision of becoming an industrialized nation in 2020, Malaysia must prepare a well-educated, skilled and competitive workforce. Thus, the government has placed human resource development as a major emphasis and a strategic policy to enhance Malaysia's competitive edge over other developing countries. In the era of globalization and k-economy, the future of Malaysia's competitiveness depends on the skills of its workforce. Therefore, it is critical to assess the impact of globalization on technical-vocational education and training systems in Malaysia. This paper will discuss several major initiatives, such as, the development of the Multimedia Super Corridor (MSC) that has placed Malaysia within the global interconnectivity with other developed nations in the world. Efforts are currently being made to fully utilize IT in transforming the Malaysian society into a knowledge-based society. The advancement of the Internet and the multimedia technologies has been increasingly visible in the government and corporate sectors. The impact of globalization and k-economy has led to a heightened awareness of the need to reform the technical-vocational and training systems. This paper also attempts to address the specific implications of globalization and k-economy on VET in Malaysia. Several recommendations will be provided.

Introduction

Globalization of economies and rapid technological change has affected virtually all countries. Even though it is difficult to state precisely what does the term "globalization" means, experts have lumped the term into three broad categories, i.e., as a process, an ideology, or a culture (Cox, 1996; Embong, 2000; Gray, 1998; Harvey, 1995; Mittelman, 1996). As such, globalization can be characterized as a multi-dimensional phenomenon which encompasses economics, politics, culture, and ideology. Thus, it can have both positive and negative effects. Benefits of globalization can be seen in the increased of economic liberalization and efficiency especially in the service sector in many countries. On the other hand, globalization can be perceived as a new form of "colonialization". In particular, Third World and developing countries are concerned that globalization can weaken both their economic and political abilities.

Malaysia has achieved one of the fastest rates of economic development of any developing country in the world (Govindan, 2000). Between 1970 and 1999, the economy grew at an average of 7% per annum, bringing along major economic and social transformation. However, with the 1997 Asian currency crisis, the economy suffered a major recession in 1998 with real GDP contracting by 7.4% (Govindan). However, the economy has rebounded quickly to reverse the slide in 1999. Further, Goh (cited in Dewan Ekonomi, March 2001, p.19) predicted that Malaysian economy would thrive based on two significant factors, i.e., strong domestic market and increased exports (Table 1).

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Table 1. GNP Growth in East Asia

	1999	2000	2020 (Projected)
Malaysia	5.6	8.7	9.8
Singapore	5.4	8.8	9.0
Thailand	4.2	5.5	6.0
Philippines	3.3	3.5	5.0
Indonesia	0.3	3.9	4.0

Note. Data source: G.K Goh (cited in Dewan Ekonomi, March 2001).

Malaysia's Global Competitiveness

Despite Malaysia's fairly healthy domestic economy, prospects for 2001 will depend substantially on global economic developments which are showing signs of down turn especially in the light of the recent terrorist attack on World Trade Center in New York. In terms of Malaysia's global competitiveness, the committee for the National K-Economy Master Plan has identified several key points that have made the transformation into knowledge-based economy crucial to Malaysia's competitiveness (Special Economic Issue, 2000). These include:

- The erosion of Malaysia's global competitiveness.

This is measured through the level of the country's competitiveness. In 1994, the World Competitiveness Report ranked Malaysia at number 18 but the country's position has eroded to 27 in 1999. In contrast, countries such as Ireland and Finland, two of the advanced countries in terms of the use of Information and Communication Technology (ICT), have improved their competitiveness position from 21st and 19th in 1994 to 11th and 3rd position, respectively in 1999.

- Extensive external competition. Countries all over the world are harnessing knowledge-intensive and technology-based industries to become their national agenda.
- Intensive internal competition. Internal competition will also heat up because barriers to outside competition will increase due to increasing globalization and liberalization.
- Rising labor costs
- The challenge of competitiveness and productivity is substantially higher today than in the past.
- Emphasis on value-added. It is believed that the knowledge-intensive industries provide greater value-added than traditional industries.
- A quantum leap in total factor productivity is needed.
- Depleting of natural resources.

Role of Vocational-Technical Education in Malaysia's Industrialization

Malaysia is a multiracial country with a population of 23 million. Constitutionally, education in Malaysia is the prerogative of the federal government. Historically, formal vocational education in Malaysia was introduced by the British in 1897 to train Malay youths as mechanics or fitters to manage the railway lines (Federation of Malaya, 1956; Zakaria, 1988). However, it was not until 1906 when the first public technical school was opened to train technicians to work in various government departments that vocational training began to have an impact (Lourdesamy, 1972). In 1926, the first trade school was opened in Kuala Lumpur, thus marked the beginning of public vocational education in Malaysia (Ministry of Education, 1967). The trade schools offered courses for fitters, electricians, carpenters, brick layers, and tailors.

The period 1961-1965 was a transitory period, where a number of changes being introduced to adapt the education system to meet the needs of a rapidly developing nation. Following the recommendation of the Education Review Committee in 1960, the trade schools, which provided two-year

courses, were converted into Rural Trade School offering apprenticeship programs for rural Malay youths who had completed six years of elementary education (Ministry of Education, 1967).

A major change in the vocational educational program occurred in 1965 when the comprehensive education system was introduced. The new system, which raised the school-leaving age to 15, was designed to change the form and content of secondary-level education by expanding and diversifying the range of courses offered. Students received general education with a vocational or technical emphasis in industrial arts (woodwork, metalwork, electricity, and power mechanics), agriculture science, commercial studies, and home science (Kee, 1973; Lourdesamy, 1972; Ministry of Education, 1967; Zakaria, 1988).

In 1987, a new vocational education system was introduced. Under this system, vocational students are given a choice; either to enroll in vocational program, which at the end of the two-year duration the students will take the Malaysian Certificate of Vocational Education (SPMV) examination, or to enroll in the skills training program at the end of 2-year training period, the students will take the National Industrial Training and Trade Certification Board (NITTCB) examination. The NITTCB was set up by the National Advisory Council of Industrial Training to provide common trade standards and to improve the training institutions throughout the country (Ministry of Education, 1989).

In the vocational track, students are given emphasis on academic subjects with the purpose of providing them a better foundation should they decide to continue their higher education in technical colleges or polytechnics, without affecting vocational skills development at the lower level. In the skills training track, students are given more time and emphasis on skills training and development as required by industry. At the end of the course, the skills track students will take the NITTCB examination. Opportunities are given to students in this track to have advanced and specialized training after completing the two-year basic skills training program. Completers of the skills training program are most likely to enter job-market immediately after graduation. Table 2 shows the enrollment in the public technical-vocational and skills training programs.

Table 2. The Enrollment in Public Technical-Vocational and Skills Training Programs in 1999

Program	Male	Female	Total
Technical and vocational	31,026	14,189	45,215 (92.1%)
Skills training	3,699	206	3,905 (7.9%)
Total	34,725	14,395	49,120

Note. From Malaysian Educational Statistics, 1999.

Continued efforts have been made to expand the supply of skilled and semi-skilled human resource through increased enrollment in the public secondary technical and vocational schools. In 1995, there were 9 technical and 69 vocational schools as compared to 58 vocational and 9 technical schools in 1990. The enrollment in these schools increased from 30,940 in 1990 to 48,800 in 1995, while the output was 13,500 for secondary technical schools and 82,700 for secondary vocational schools for the 1990-1995 period (Economic Planning Unit, 1996). The majority of the graduates from secondary technical schools continued their studies in various post-secondary institutions, while the graduates from vocational and skill programs were mainly absorbed into the workforce.

Technical Schools

In 1996, the Ministry of Education has made a dramatic shift to upgrade technical education, not only because of the requirements of the economy but also to increase more science and technical human resource (Economic Planning Unit, 1996). In this regard, 22 secondary vocational schools were converted into secondary technical schools for the 1996 school session. In 2000, the conversion increases technical schools to 77 and reduces vocational schools to 4 (Malaysian Educational Statistics, 2000). At the same time, engineering technology and technical drawing subjects were also introduced in selected academic secondary schools. The move was to open up opportunities for academic students who inclined to be in technical areas as well as to prepare them to continue their studies in various science and technical-related disciplines at the post-secondary level (Economic Planning Unit, 1996). However, this conversion was

criticized by vocational educators who perceive that the shift will severely restrict the future supply of blue-collar skilled workers that are already in severe shortage (Abdul Raof, 1996).

Polytechnics

Since 1969, the Ministry of Education has established 12 public polytechnics as post-secondary learning institutions for technical and commercial training. The main objective is to train secondary school leavers to become qualified technical assistants, technicians, technologists, paraprofessionals, and business personnel. Polytechnics are internally accredited by the Ministry of Education and many have received external ISO 9002 certification.

Presently, all courses offered by the polytechnics are full-time courses and are categorized as either Certificate or Diploma programs. All certificate programs are of two-year duration, while most diploma programs are of three-year duration; with the exception of Diploma in Marine Engineering (4 years) and Diploma in Secretarial Science (2 years). Industrial training where students work in an industry setting for a period of one semester, is a requirement for all programs. The industrial training allows students to experience working conditions and to expose them to the realities and demands of the industrial and commercial sectors (Ministry of Education, 1994).

Post-secondary Advanced Skills Training Programs

Advanced public and private skills training institutions have been established to supply adequate skilled workers to meet the expanding industrial sector. Various measures were taken to increase training capacity through the expansion of existing facilities and the establishment of new institutions. The intake of trainees was also increased through the introduction of double-shift training sessions and the implementation of weekend classes. These measures may result in an increase in the output of trainees from 21,169 in 1990 to 51,983 in 2000 as shown in Table 3. In general, public training institutions show an increase in the output in 2000 especially in printing trades and skill upgrading programs. Private training institutions, however, show an increase in the output in electrical engineering programs and printing trades.

Table 3. Output of Skilled and Semi-Skilled Graduates from Public and Private Training Institutions

Program	1990 Public	1990 Private	1990 Total	2000 Public	2000 Private	2000 Total
Engineering:	15,076	2,715	17,791	22,994	15,078	38,072
Mechanical	9,661	709	10,370	11,862	3,378	15,240
Electrical	5,230	1,936	7,166	10,896	11,551	22,447
Civil	185	70	255	236	149	385
Building Trades	2,686	110	2,796	3,954	412	4,366
Printing Trades	29	9	38	2,392	51	2,443
Others	18	429	447	4,984	1,158	6,142
Skill-Upgrading	97	n.a.	97	960	n.a.	960
Total	17,906	3,263	21,169	35,284	16,699	51,983

Note. From Economic Planning Unit, 1996.

To meet the needs for higher skilled workers especially in the new technology clusters and to take advantage of advanced technology in developed countries, advanced skilled training institutes were established with the cooperation of the Federal Republic of Germany, France, and Japan. The German-

Malaysian Institute (GMI), established in 1992, offered advanced skill training, particularly in production technology and industrial electronics. The institute, with a maximum enrollment capacity of 450 trainees, produced its first batch of 57 graduates in 1995. The Malaysian-France Institute (MFI), began operation in October 1995, had a capacity of 600 trainees and offered courses at advanced level in areas such as maintenance of automated mechanical systems, electrical equipment installation and welding technology. In addition, the establishment of the Japan-Malaysia Technical Institute (JMTI) is at the planning stage.

The Employment

Based on GDP growth of 7 percent per annum, the demand for labor will increase by 3.1 percent annually during 1990-2000 period (Economic Planning Unit, 1996). Total employment is projected to increase from about 6.7 million in 1990 to about 9 million in the year 2000 as shown in Table 4. Employment is expected to increase in manufacturing, construction, and services sector of the economy. However, employment in traditional sector such as agriculture, mining, and the government is expected to decrease. With labor supply growing at 2.9 percent annually, the unemployment rate is expected to decrease from 5.1 percent in 1990 to about 2.8 percent by the end of the decade. Table 4 shows figures of employment in different sectors.

Table 4. Numbers of Employment in Different Sectors, 1990-2000

	1999		2000	
Sector	('000)	(%)	('000)	(%)
Agriculture, Forestry Livestock & Fishing	1,738	26	1,187.7	13.1
Mining & Quarrying	37	0.6	44.5	0.5
Manufacturing	1,333	19.9	2,616.3	28.9
Construction	424	6.3	845.4	9.3
Services	1,825	27.3	2,539.5	27.9
Government	850	12.7	894.2	9.9
Other Services	479	7.2	938.6	10.4
Total	6,686	100	9,066.2	100
Labor Force:	7,042		9,327.1	
Local	6,752		8,546.1	
Foreign	290		781	
Unemployment	356	5.1	260.9	2.8

Note: From Economic Planning Unit, 1996.

Because of high growth of the working-age population, an increase in the labor force participation rate from 66 percent in 1990 to 66.9 percent in 1995, and large inflows of foreign labor, the labor force increased at an average annual rate of 2.9 percent during 1990-1995 (Economic Planning Unit, 1996). The labor force participation is expected to reach 68 percent in the year 2000. The male labor force participation rate increased from 86.3 percent in 1990 to 86.8 percent in 1995, while the rate of females increased from 45.8 percent to 47.1 percent during the same period (Economic Planning Unit, 1996). The educational profile of the labor force shows a progressively more educated workforce. About 55 percent of the labor force had secondary education in 1995 as compared to 52 percent in 1990. In addition, while 5.3 percent of the labor force had college or university qualification in 1990, the proportion was 6.3 in 1995. Despite this increase, the proportion was still relatively low compared to developed nations. Therefore, systematic plan should be made to increase the supply of highly educated human resource (Economic Planning Unit, 1996).

Impact of Globalization on Vocational and Technical Education

In the era of globalization, the relationship between employer and employees will be different. The traditional covenant where the employees could expect a stable or lifelong employment will no longer apply (Lourdesamy, 2000). The retention of employees will most probably be based on the skills and knowledge that the employees possess that can create advantages for the company over its competitors.

The new global market calls for visionary leadership and the adoption and application of new management and organizational principles. The old command-and-control management system that many Malaysian organizations are used to will not work in a new competitive environment. Our education, training, and employment policies have to change. Employers need to recruit "knowledge" workers for higher skills jobs. This requires our education system to produce graduates with relevant knowledge, critical and higher-order skills, and proper attitudes. Research (Mustapha, 1999) have shown that Malaysian employers were not satisfied with the quality of our technical and vocational graduates in terms of their lacking of leadership, communication, interpersonal, critical thinking and enterpreneurial skills. In order to be competitive, several bold steps should be taken by the relevant authorities in order to upgrade vocational and technical education in Malaysia. These include:

IT Infrastructure

Prime Minister Mahathir Mohamad created a distinct cyberwave in 1996 when he officially launched the Multimedia Super Corridor (MSC) at the Asia Multimedia Conference '96 in Kuala Lumpur (Abdul Manab & Othman, 1999). The MSC is a 15-by-50 kilometer zone encompassing the world's tallest building and the new ultra modern International Airport in Sepang. It aims at revolutionizing IT and multimedia industries by creating a massive corridor with conducive environment for local and international companies wanting to create, distribute, and employ IT and multimedia products and services (Abdul Manab & Othman, 1999). MSC is also expected to place Malaysia as a regional and international technology and telecommunication hub. The MSC will propel the transfer of technology and become the test bed for R&D in high-tech industries (Mohamed et al, 1999).

Due to the increasing demand for knowledge workers to work in the IT and high-tech industries of the MSC, Smart Schools program was adopted as one of the 7 Flagship applications. The flagship will support the government's plan to obtain the status of an industrialized nation by the year 2020 and to gain a competitive edge over other developing countries in the global economy (Mohamed et al, 1999). In the Smart School concept, learning will be self-directed, individually-paced, contextualized and reflective using IT as a prime enabler (Abdul Manab & Othman, 1999). It is hoped that, eventually, all schools in this country will be smart schools.

Despite the MSC and the Smart Schools, Information Technology presents many challenges to the education system. At the school level, especially in public school system, the infrastructure and the facilities for computer and the Internet are still at the minimal level (Ismail, 2000). A recent study by the National Information Technology Council (2000) which highlighted that a total of 5,010 or 69.5 percent of primary and 758 or 46.2 percent of secondary schools in Malaysia do not have computer facilities. A total of 6,478 or 89.8 per cent of primary and 1,082 of secondary schools do not have Internet access. Furthermore, about 276,000 households constituting 1.2 million Malaysians are considered as "marginalized" when it comes to access to information technology.

In general, schools in Malaysia continue to lag behind other sectors such as business and entertainment in utilizing IT and multimedia technologies. A majority of schools still do not have enough computers and Internet facility for most students to use frequently. However, during the last decade the increase in IT access and the emergence of new telecommunication technologies have somewhat changed how teachers perceive technology and its applications in teaching and learning.

It is evident that the government policies clearly emphasize the crucial role of IT but the implementation is largely unsatisfactory especially at the primary and secondary school levels. The need for the highest level commitment to equip Malaysian schools, including vocational and technical schools, with computers and IT facilities is critical. For example, in the United States in 1994, the percentage of the US classrooms with Internet access was just 3 percent. In 1996, President Clinton announced a set of national education goals which included connecting every classroom in the US to the Internet. By 1997, the proportion of connected classrooms had grown to 27 percent (National Center for Education Statistics, 1999). In 1999, the US department of Education announced that over half of the US classroom have Internet access; by the Fall 1999, the department expects 80 percent of the US classrooms to have Internet connection. This was partly attributed to the impact of the "E-rate" or telecommunications discount to schools and libraries passed by the US Congress in 1996 (Means, 2000).

The implementation of IT and multimedia technologies has not yet reached their satisfactory level in school settings. To reach their maximum potential requires full commitment, serious thinking, research, and experimentation. Although Malaysia has made great strides to enhance IT infrastructure, the IT utilization and structure in educational institutions are still inadequate. Teachers and administrators should reevaluate and restructure the curriculum so that the curriculum is viable for IT skills to be developed among students (Muhamed et al, 1999). Also, teacher training program should integrate IT in its curriculum so that more teachers are trained in IT.

Highest Level Commitment

The Government has already recognized the importance of adapting to this new economy and is committed to transform the economy from a production based to a knowledge driven economy. The Prime Minister during his official speech at the launching of the information technology campaign in 1997 stated that Information Technology is at the forefront of the country's national socio-economic planning and development. The Government has formulated the National Information Technology Agenda (NITA) in 1996 to provide the country with the direction and the way forward with IT. The NITA has spelt out a three-pronged strategy aimed at developing a knowledge society through building and developing the appropriate IT structure, the creation and development of IT-based applications and human development effort. In order to achieve this, the balanced development of three important, inter-related elements that involves people, infostructure and applications are stressed (Special Economic Issue, 2000).

K-Economy Master Plan

The Malaysian K-Economy Master Plan, due in mid-2001, will outline the major K-Economy policy initiatives. Some project details have been announced in advance of this, being included in the 2001 budget released in October 2000. Many projects involve collaboration between the state and the private sector. Planned reforms to the education sector include further privatization, twinning arrangements with foreign institutions, and the construction of advanced technical institutes and community colleges. Infrastructure will be developed that allows for the use of electronic diagnostic tools in hospitals and networking between government departments, their suppliers and their customers. Increased bandwidth is planned to facilitate greater e-commerce capacity. A draft of amendments to various financial regulations aims to create a more favorable investment environment for local and foreign firms particularly those in designated high technology sectors. Some initiatives, particularly those in the construction sector, are a repackaging of projects postponed due to the financial crisis of 1997. Overall, these policies aim to address the serious shortages of knowledge and skilled workers in Malaysia, and to attract much-needed foreign investment and expertise, particularly in alliances with local firms and institutions. The 2001 Budget also included profit repatriation and taxation arrangements designed to lure foreign investors back. This is in addition to a very publicized crackdown on software piracy.

IT Literate Society

Reflected in particular K-Economy policies, the 'One Home-One PC' scheme, administered by the government-owned national postal service, Pos Malaysia, allows workers with children over the age of 10 to withdraw their contributions to the Employees Provident Fund to purchase a personal computer. Internet access is provided by the TMNet, part of Telekom Malaysia, another government-owned corporation. This initiative supports the longer term plan to link 25 percent of the population to the Internet by 2005. Another initiative involving Pos Malaysia is the 'Internet Desa' (Internet for Rural Areas) program, which aims to provide internet access and basic computer skills to people in rural areas via a networked personal computer located in their local post office. Ethnic Malays are more likely to live in rural and regional areas than people from the Chinese or Indian minorities.

Setting up National Agencies to Spearhead K-Economy

The National Information Technology Council (NITC) was established in 1994 to guide the country toward the knowledge empowerment of Vision 2020. The NITC aims to enhance the development and utilization of ICT as a strategic technology for national development. The NITC acts as a think-tank at the highest level and advises the government on matters pertaining to the development of ICT in Malaysia (Infosoc Malaysia, 2000). The Government's commitment towards the creation of a knowledge-based economy is also evidence from the development of the Multimedia Super Corridor, the idea mooted in 1994, and the creation of a pioneer legal and regulatory framework encompassing, inter alia, the Communication and Multimedia Act, the Computer Crimes Act and Digital Signatures Act (Special Economic Issue, 2000).

Tangible evidence of Malaysia's commitment to the K-Economy is the Multimedia Super Corridor (MSC). This 50 x 15 kilometer wide corridor stretches from the center of Kuala Lumpur to Cyberjaya, a newly established 'city' approximately 40 kilometres to the south, and is designed to incubate

high technology companies. When the MSC was first announced in 1995, it was estimated that the government would spend RM 28billion (approximately USD 7.4b) to develop the infrastructure and facilities required to attract international high technology companies.

Development of Knowledge Workers

The creation of quality human resources is important in K-Economy. These individuals will form the backbone of the K-Economy. Knowledge workers are versatile, autonomous and highly skilled and are able to leverage and build knowledge to produce useful action with very strong and analytical skills. They are flexible and with high tolerance for ambiguity. For Malaysia to produce a pool of K-leaders and K-workers, the educational system needs to be revamped and restructured. The focus should be directed on how to make the existing curriculum more innovative to help students to invent and develop a critical and analytical mode of thinking and ultimately create a sufficient pool of well educated, highly skilled and strongly motivated work force (Special Economic Issue, 2000).

In this area, the government has already taken the initiative of introducing Smart School projects that was launched during the review of the Seventh Malaysia Plan (1996-2000). The objective of these projects is to produce a new generation of IT-literate Malaysians who are creative and innovative, adept with new technologies and able to access and manage information to enhance the competitiveness and productivity of the economy. At the same time, the government is campaigning hard to woo back Malaysians who are now working overseas. In March 2000, the Prime Minister announced a campaign to attract 5,000 skilled foreign workers a year to help take the nation into the information age to ensure a massive brain gain, an infusion of men and women of extraordinary talent, creativity, knowledge, skill and other capabilities (Special Economic Issue, 2000).

To advance Malaysia into the forefront of knowledge, investment in human capital is critical, as a K-Economy demands creative, innovative and knowledge human resources. It is for this reason, the state has continued to allocate substantial portion of the National Budget for financing the expansion and upgrading of the education and training facilities. However, human resource development needs to be further intensified particularly through public-private sector collaboration in building science and technology human resources as well as the intellectual capability and competency in management and entrepreneurship. In this regard, opportunities for life-long learning for all levels of work force should be enhanced through this collaboration.

Rigorous R&D

The structure of the economy will become less distinct in the K-Economy. Nevertheless, the manufacturing sector, which accounts for more than one third of the GDP of the country, will continue to assume an important role in the K-Economy. However, in view of the migration of the economy from production-based to knowledge-based, the manufacturing sector would have to gear up to adjust to the rapid change in technological advancement by improving its products through R&D and enhancing the pool of knowledge workers (Special Economic Issue, 2000).

In a K-Economy, it is highly critical to develop the R&D and the service sector. It is generally known that the level of development of the services sector, particularly the knowledge-intensive segments of it, has become a key determinant of national competitiveness for economies. There are many compelling reasons for Malaysia to develop its services sector. To begin with, expanding this sector helps create national wealth: a positive correlation exists between high GDP per capita and the intensity of services activity in the economy, mostly because compensation levels in this sector normally surpass those in agriculture and manufacturing. Moreover, in economies with a strong emphasis on services, people tend to climb the "value-chain ladder" much more rapidly. It is generally believed that in the K-Economy, the information-related industries and knowledge-intensive industries will play the dominant role (Special Economic Issue, 2000).

Innovation is one of the key success factors in a K-Economy and it is R&D that determines innovation. According to the OECD (1996), the proxies generally used to represent the production of new ideas and innovation is R&D expenditure and the number of patents. Based on some available relevant statistics (Table 5), it is apparent that Malaysia currently has a relatively low share of IT skills to work force, K-skills in R&D per million of population and R&D investment to GDP.

Table 5. Knowledge-Workforce Among Selected Countries

Selected R&D Statistics (1997)			
Countries	K-skills Workforce (as % of total workforce)	R&D/ GDP (%)	K-skills in R&D (per million population)
Malaysia	10.7	0.3	87
Singapore	26.4	1.4	2512
Korea	15.1	2.8	2636
Taiwan	15.5	1.9	3340
Japan	22.9	2.8	5677

Note. Data source: Bank Negara Malaysia, 2000.

Creativity, Innovation, and Entrepreneurship

ICT leaders and business gurus believe the new economy is about the power of ideas and knowledge, which is why it is important to encourage entrepreneurship in Malaysia. Entrepreneurship is a collaborative effort. It may be easy to generate ideas, but hard to provide a conducive environment to allow the ideas to kick-start and grow. School systems at all levels should include entrepreneurship in their curriculum. It should focus on creating new and innovative ideas by the students and converting them into "patents" or full-fledged business plans for future use.

Need to Reduce Overreliance on Foreign Direct Investment (FDI)

So far, several incentives have been introduced to encourage the private sector to participate more actively in R&D. These incentives are in the forms of Double Tax Deduction, Industrial Building Allowance, Capital Allowance and Import Duty exemption on machinery/equipment, materials, raw materials/component parts and samples used for R&D. However, Malaysia should no longer rely on the strategy of offering foreign investors liberal industrial incentives and cheap labor to generate economic growth. Thus, the country could not bank on the traditional approach of "catching up" (Star, 2000 September 7).

In view of this, economic growth had to be endogenously driven with increasing emphasis on knowledge, productivity, education and human capital. The productivity-driven growth is crucial to achieve sustainable growth with low inflation. It was essential to make the transition to the K-Economy because labor and capital inputs could no longer provide the impetus for rapid economic growth. The injection of more capital to stimulate growth was not a good strategy because this would result in a diminishing marginal rate of productivity and consequently the deterioration of the incremental capital-output ratio.

The K-economy is focusing on enhancing the capacity of industries to undertake research and development and product development design as well as use ICT in distribution and marketing activities. It is also possible to use multimedia applications to develop new high value-added knowledge-intensive industries and services such as telecommerce, electronic money, distance learning and paperless government. However, the shift to the K-Economy did not imply that the traditional production or agricultural activities would be abandoned. Traditional industries can be improved by value added of these activities to a higher threshold by applying higher levels of knowledge to increase productivity.

Infrastructure, Accessibility and Connectivity

There must be affordable and equitable access and connectivity to ensure that all levels of society can participate in the new economy. Businesses and citizens must have access to a low-cost, high-speed communication infrastructure. This is key to a balanced urban and regional development across the country. Reducing access costs plays a major role in this context. In terms of accessibility to ICT infrastructure, Malaysia performed better compared to the other developing countries but the situation reversed when compared with advanced countries; Malaysia still lag behind in all measures. Table 4 shows the number of personal computer and Internet host in Malaysia vis-à-vis other countries.

Table 6. Indicators of Communication and Information Infrastructure Among Selected Countries

Indicators of Communication and Information Infrastructure in 1996.		
Countries	No. of Personal Computers (per 1000 population)	No. of Internet Hosts (per 1000 population)
Malaysia	43	19
United States	362	442
United Kingdom	193	149
Japan	128	76
South Korea	132	29
Singapore	217	196

Note. Data source: Jaafar, 2000.

At the same time a comparison made between all states in the country showed that the level of penetration rate was very uneven among states. This implied a gap in development and potential problem of IT diffusion. To address this gap, there is an urgent need to improve accessibility to ICT infrastructure for the majority of the population be it urban or rural. There is a need to ensure rural access to IT equipment and services in order to ensure that they will not be left out to take part in the advancement of the K-Economy (Special Economic Issue, 2000).

Life-long Learning

With knowledge replacing physical and natural resources as the key ingredient in economic development, the education system and human resource development policies must be given due priority. The approach to human resource development (HRD) must be balance and holistic. There must be genuine smart partnership between government ministries, especially the Human Resource and Education Ministries, and between the private and public sectors to strategize and implement a human resource policy that is directed towards fulfilling the objectives of a K-Economy (Badawi, 2000). As the economic development is now more dynamic than ever due to rapid technological improvements and global competition, the skills needed to succeed in this new economy will be different. Few will be able to equip themselves with lifetime working skills just from their years of formal education.

Life-long learning conducted through non-formal channels such as virtual universities and distance learning, with skill acquisition at all age levels, must be promoted if the human resource is to constantly stay abreast of new and rapid developments in the K-Economy. In the context of human resource development, Malaysia needs to adopt a two-pronged strategy (Badawi, 2000). One is to ensure that those who are currently unskilled or low-skilled are given the opportunity to learn and train so that they can have a productive role in the K-Economy. And secondly, incentives and opportunities must be given to those with potential to keep on acquiring knowledge and skills. Human resource development must move every Malaysian up the skill ladder, and at the same time reward excellence by allowing every one to fulfill their potential. If the school and training systems fail to train and retrain the traditional workers, their existing skills may become obsolete in the new economic environments. If

those with minimal education, knowledge or skills were not given the opportunity to continue their education, they would lag behind and would be less likely to participate in K-Economy. Indirectly, the government would lose precious human capital that could have been harnessed effectively into a new economic paradigm. Therefore, human resource development must be viewed not only from the perspective of social justice where every Malaysian is given the opportunity to succeed, but also from the point of view that in a K-Economy where every individual is given the chance to contribute at his or her optimum level.

It is evident that the Malaysian government is committed to building a critical mass of knowledge workers. Already under consideration are plans to build more advanced technical-industrial training institutes and community colleges. In addition, the establishment of more 'second route' programs aimed at giving school leavers the opportunity to re-sit examinations or guiding them towards technical and vocational training. There is also a need for greater alliances between universities and the private sector to encourage industrial placements, internships and targeted human resource development. Greater attention must also be given to training workers in the small and medium industries (SMI). Most large firms can afford to invest in training, retraining and R&D.

Therefore, public sector HRD initiatives must prioritize SMI workers who are not given opportunities to enhance their skills by their employers. At the same time ICT training must be promoted, especially among working adults, to increase IT literacy among the workforce. School teachers should be given incentives to continue to upgrade their ICT skills in light of the primacy of these tools in the K-Economy. Civil servants and servicemen should also be given this training so that they are able to be absorbed into the technology intensive private sector upon the completion of their service. ICT training should also be extended to non-working adults such as the disabled, older folks and housewives so that they can contribute to the K-Economy as virtual home-based workers, offering services through virtual interfaces such as the internet.

In recognizing that human resource development is a critical factor in a K-Economy, more genuine smart partnerships between the public and private sector should be established. In particular, the private sector must play a greater role in technical and vocational training in order to complement the effort that has been put in by the government at the moment. The government should continue to assist the private sector in training and retraining workers, but there must be a continued commitment from the private sector to encourage and provide incentives for their workers to acquire more skills.

Recommendations

Some of the recommendations include:

- Set the target of making Malaysia one of the world's top 10 knowledge and information powers.
- Provide a world-class telecommunication system that is accessible to all at competitive prices.
- Create an information society for all, where every citizen can play an active role in the K-Economy.
- Promote the use of information technologies in all sectors.
- Invest in human capital. Brainpower is the critical factor that will determine the competitiveness of nations in the 21st century.
- Equip all schools with high-speed Internet connections, and multimedia PCs in sufficient numbers.
- Adapt the school curriculum and train the teachers in IT.
- Provide opportunities for lifelong learning.
- Invest in extensive research and development in order to increase the country's competitiveness both regionally and internationally.
- Establish systematic R&D networks linking businesses, educational institutions and research institutes.

- Recognize and reward individuals or industries that involve in creative and innovative work practices.
- Promote smart partnerships between public and private sectors.

Conclusion

To compete and survive in the era of K-Economy and globalization, Malaysia needs to find a new niche as it can no longer rely on being a low cost producer or the center for cheap labor. It is important for the country to embrace knowledge in all factors of production in order to create value added products as well as services. The Government has laid a foundation for the economy to transform from a P-based to a K-based economy. Nevertheless, there are many challenges and issues that need to be address before the country can move successfully to K-Economy. The Government is responsive toward ensuring that the country adapt and embrace the information age and new economy and has laid out several policies and incentives to ensure that the progress toward the new development phase is achieved. Among the important steps that have been taken include the setting up of the National Information Technology Agenda, Multimedia Super Corridor and the Master Plan for the K-Economy. The Government has also laid out basic ICT infrastructure, which is the most important factor in K-Economy. Nevertheless, there are several challenges that the country will face and need to address before it can move successfully into the K-Economy. The new global market calls for visionary leadership and the adoption and application of new management and organizational principles. The old command-and-control management system that many Malaysian organizations are used to will not work in a new competitive environment. K-Economy has required knowlegable, skilled, dynamic, creative and innovative human resources. Thus, the education, training, and employment policies have to change. Employers need to recruit "knowledge" workers for higher skills jobs. This requires our education system to produce graduates with relevant knowledge, critical skills, and proper attitudes. Teacher training program must also undergo substantial transformation especially in technical and vocational education. The current technical education and training systems in Malaysia need to be improved to ensure that skilled and knowledge workers' shortages will not pose a serious bottleneck to future industrialization.

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